July 28, 2011

Matthew W. Busch
WMB & Associates Inc.
22421 Barton Road, #125
Grand Terrace, CA 92313

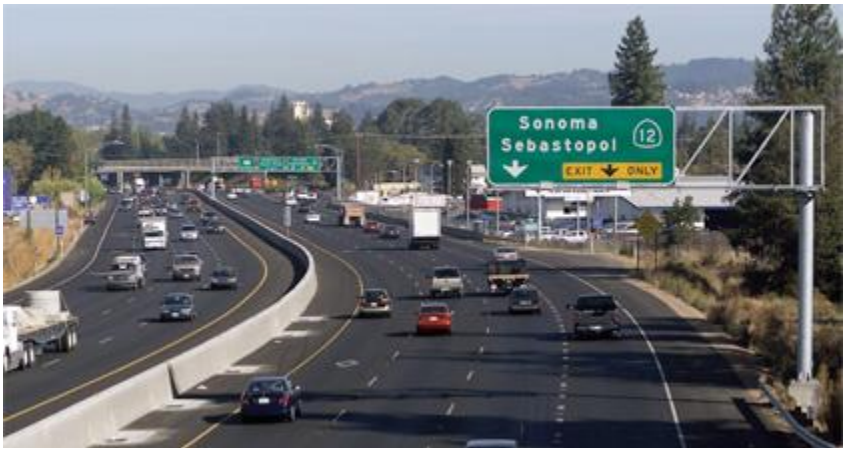
Marlene H. Dortch, Secretary
Federal Communications Commission
445 12th Street SW
Washington, DC 20554
Re: IB Docket No. 11-109

Dear Ms. Dortch,

I have serious concerns about LightSquared's proposal for a nationwide 4G LTE system. I'm afraid that LightSquared has not truthfully explained the potential impact of LightSquared's proposed system on GPS receivers, America's small businesses, and America's economy. Though Land surveying and Civil engineering companies may represent a very small percentage of GPS users as a whole, the expense of our high precision GPS equipment is very steep (Approximately $20,000/unit) and represents billions of dollars of investment by the Survey/Engineering industry.

As a small business that uses high-precision GPS receivers I would be irreparably harmed by the disruption of signal and use of Real-time Kinematic (RTK) GPS measurements for my daily work. I currently employ approximately 11 people in the surveying industry and I rely heavily upon my ability to use RTK GPS field measurements in order to be competitive and obtain work. During a time when construction related projects and companies are already reeling from the current economic situation the requirement to purchase new equipment and the delay in the availability of such equipment that will result from Lightsquared's potential interference with the L1 signal work will probably put me and many other small land surveying companies out of business.

In road construction, high-precision GPS offers a 5-to-1 efficiency advantage over legacy construction equipment. Can you imagine the delays if road construction projects took five times longer to complete? California's Department of Transportation (CALTRANS) currently has 846 construction projects ongoing with construction costs of ~$10.5 billion. High-precision GPS receivers are a critical component of these projects. Projects such as the widening project pictured below, are completed way ahead of schedule. For this reason, CALTRANS has invested in 250 high-precision GPS receivers valued at ~$5 million (~$20,000 per receiver).



CALTRANS Highway 101 project widened the route from four to six lanes to extend the carpool lane for two and a half miles and upgrade a congested interchange in Santa Rosa, six months ahead of schedule

It’s not just large, high-precision GPS receiver deployments that matter. GPS also keeps the public safe.

In Florida, the 5.5 mile Sunshine Skyway Bridge spanning Tampa Bay has five high-precision GPS receivers permanently mounted on it so engineers can monitor the health of the structure. On an annual basis, more than 18 million vehicles travel over the bridge. High-precision GPS is a core technology that ensures the safety of those 18 million vehicles.

The structural integrity of the Sunshine Skyway Bridge over Tampa Bay is continuously monitored by high-precision GPS receivers, ensuring the safety of more than 18 million vehicles per year

It’s not just thousands of public entities that are invested in high-precision GPS technology. Tens of thousands of U.S. small businesses rely on high-precision GPS technology in their daily operations.

High-precision GPS allows us to obtain measurements between monuments which are miles apart to control land boundaries in a couple of hours that 20 years ago would required 20 to 30 hours of field crew time. The change in technology comes with our investment of approximately $85,000 which is very significant for a small firm like mine. If I am to wake up here in the next year and find my equipment useless for high-precision GPS, the effects would be devastating to my company and clients in both private development and public infrastructure."

Finally, high-precision GPS users rely on a complex infrastructure of 7,000+ high-precision, fixed-mount GPS base stations deployed nationwide. The infrastructure began with a few receivers in the early 1990s and has been built upon over the past 18 years by the GPS user community volunteering time, money, equipment, and expertise. It would be impossible to replace all of these receivers since the ownership is so disparate. Many are publicly owned and the rest are commercially owned by businesses and used by people in all the market segments I listed above. To illustrate, one such network consisting of more than 875 high-precision GPS receivers is located in the western United States managed by UNAVCO, a university-governed consortium which is sponsored by the National Science Foundation (NSF), National Aeronautics and Space Administration (NASA), U.S. Geological Survey (USGS), and National Oceanographic and Atmospheric Administration (NOAA).

UNAVCO uses this massive network of high-precision GPS receivers to, among other things, monitor the earth’s crustal plate movement (think earthquake montoring).

Recommendations

I'm grateful for this 30-day public comment period as I think it will give the FCC and LightSquared a new perspective on the impact that disrupting high-precision GPS receivers would have on the GPS user community and America's economy.

Although I'm in favor of a nationwide 4G LTE system, I'm opposed to LightSquared's proposed plan for the following reasons:

1. The GPS user community knew this was coming and chose to do nothing. This is false. Contrary to what LightSquared asserts, the GPS user community did not know anything about this potential interference until November 2010. LightSquared and the FCC incorrectly assumed that communicating/negotiating with the U.S. GPS Industry Council (USGIC) was the equivalent of communicating/negotiating with the GPS user community. That is a false assumption. The USGIC does not communicate directly with the GPS user community and never has. That's not its role. I've been personally involved in the high-precision GPS industry for 20+ years and writing a monthly newsletter on high-precision GPS technology for *GPS World* magazine for the past five years. I attend almost every major GPS conference and high-precision GPS market segment conference in the U.S. and some abroad. The first I'd heard about the LightSquared interference issue was November 2010.

Furthermore, there is a clear precedent already set that demonstrates how to handle a case very similar to the current LightSquared situation. In 2008, the U.S. Air Force proposed to discontinue supporting the semicodeless technique that is used by virtually every civilian L1/L2 high-precision GPS receiver in existence. It was the first time in history that an action would render several hundred thousand high-precision GPS receivers obsolete, a scale which is very similar to the impact of the LightSquared system.

There was no industry coalition formed to engage the Air Force. There was no industry outcry. A public/private technical working group was not formed to test the effects on receivers if semicodeless was not supported. Why is that?

The answer is very simple. The U.S. Air Force, to its credit, did a fantastic job of communicating directly with the GPS user community along with the Department of Commerce. It issued public statements describing the impact the action would have on high-precision GPS receivers.

The U.S. Air Force did its homework. At the end of the day, it set a sunset date of December 31, 2020, to discontinue supporting the semicodeless technique. It correctly determined that 12 years is about the amount of time that would allow a smooth transition with a manageable financial impact to the high-precision GPS user community.

Imagine if the U.S. Air Force had set a period of one year to transition away from using the semicodeless technique. That action would have destroyed the high-precision GPS user community resulting in billions of dollars in losses and widespread small business closure. Fortunately, they did their homework, understood the impact, and made the correct decision.

LightSquared, on the other hand, either didn't do its homework or intentionally kept quiet in order to fly under the radar and push its initiative through before the GPS user community (and others) knew what was happening. In either case, the GPS user community shouldn't be held accountable in paying for the FCC's and LightSquared's lack of communication/notification.

2. The FCC needs to consider future GPS signals as well as satellite signals from other satellite navigation systems. The FCC needs to investigate the effect of the LightSquared system on the future GPS L1C signal as well as GLONASS L1 (Russia), Galileo L1 (Europe), and Compass L1 (Chinese) to understand the effect on receivers of today and of the future. GPS L1C, Galileo L1, and Compass L1 all use wider bandwidth than today's GPS L1, which makes them even more susceptible to interference from LightSquared's system.

L1 and L5 are the GPS, GLONASS, Galileo, and Compass signals of the future. Those signals will drive hundreds of billions of dollars in revenue because they will bring high-precision accuracy to our everyday lives, which is something only available on very expensive GPS receivers today.

Again, precedence has been set. Look at what happened to GPS navigation after Selective Availability (SA) was turned off in May 2000. Overnight, GPS accuracy improved from 100 meters to 10 meters, and subsequently the multi-billion dollar market for GPS automobile navigation devices was launched. Companies like TomTom grew from zero revenue to multi-billion dollar corporations.

The same is expected to happen again when mainstream GPS accuracy improves from 10 meters to well under a meter using the L1 and L5 signals, but that will only occur if the GPS L1, GLONASS L1, Galileo L1, and Compass L1 signals are protected. Some say that L2 can be used instead of L1 in the future. While that's true for GPS, L1 and L5 have become the international standard while L2 is not supported by the international community.

3. LightSquared mobile devices are potentially portable GPS jammers. The FCC needs to seriously investigate the interference impact of LightSquared mobile handsets (1626.5-1660.5 Mhz) on GPS receivers. It is already known that Inmarsat (1626.5-1660.5 MHz) devices and Iridium (1616-1626.5 MHz) devices interfere with each other, but Iridium devices are only used in remote areas so it's not a widespread problem. It is also known that these devices interfere with the GLONASS L1 signal (1597-1605 MHz). We don't know the extent of the effect that LightSquared mobile devices will have on GLONASS L1, GPS L1, Galileo L1, or Compass L1 signals. The problem is that no LightSquared mobile phones are available to test. Yes, lab simulations can be performed, but LightSquared devices will be made in Asia, among other places, where the designers won't care one bit about GPS interference. There is not an acceptable design margin, if any, to allow for sloppy LightSquared device designs.

The consequence of LightSquared mobile devices interfering with GPS L1, GLONASS L1, Galileo L1, and Compass L1 is hard to imagine and might be worse than interference from the 40,000 LightSquared towers. Although the LightSquared mobile devices are much lower power (2-3 watts vs. 1,500 watts), LightSquared has announced they intend to deploy more than 250 million mobile devices, which could behave like portable GPS jammers.

Please pay attention this important technical issue that many have chose to ignore.

4. LightSquared needs to permanently abandon using the upper frequency spectrum (1545-1555 MHz) for terrestrial broadcasting. The idea of LightSquared using its licensed upper frequency spectrum (1545-1555 MHz) for terrestrial purpose needs to be permanently abandoned. It's clear from the test results that this causes widespread GPS interference no matter which class of GPS is used.

Finally, I would like to emphasize that the GPS user community should bear no cost as a result of any interference from LightSquared's system. The GPS user community was blindsided in November 2010. While you can debate whether about the communication between the FCC, MSV/Skyterra/LightSquared, and the U.S. GPS Industry Council, no case can be made that the GPS user community knew of MSV/Skyterra/LightSquared's intentions earlier than late last year, yet the FCC and LightSquared expect the GPS user community to bear the cost of interference caused by LightSquared's system?

Furthermore, far too little testing has been completed in order to fully understand the impact of LightSquared's system on GPS receivers. Yes, we have a rough idea of the scale of interference from the test reports submitted in June 2011, but the devil is in the details.

Even if LightSquared only uses the licensed lower spectrum (1526-1536 MHz), as it has proposed as an alternative, the number of high-precision receivers affected would be at least 200,000 at an estimated replacement cost of $10,000 per unit which equates to a total equipment replacement cost of $2 billion dollars. That does not include the cost of removal/installation, lost productivity, required software upgrades, and training. Does the FCC expect the GPS user community to bear that cost?

For the above reasons, I recommend that the FCC deny LightSquared's request to proceed and encouraged them to use spectrum outside of the MSS band. The resources expended by federal/state/local governments and private corporations to vet LightSquared's proposal to use the MSS band has run into the tens of millions of dollars, if not more than a one hundred million dollars. I'm afraid the cost of further vetting will double or triple the expenditure as well as result in tremendous opportunity cost as significant resources are expended by public and commercial entities to continue this debate.

Thank you for your attention.

Sincerely,

Matthew W. Busch
Vice President
WMB & Associates Inc.
22421 Barton Road, #125
Grand Terrace, CA 92313